PCT/IE 00/00103

10/07 0570 #2

Patents Office
Government Buildings
Hebron Road
Kilkenny

IE 00/00103

4

I HEREBY CERTIFY that annexed hereto is a true copy of documents filed in connection with the following patent application:

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN COMPLIANCE WITH RULE 17.1(a) OR (b)

Application No.	S990760
Date of Filing	9 September 1999
Applicant	DAIRYGOLD TECHNOLOGIES LIMITED, an Irish company of Stapleton House, 89 South Mall, Cork, Ireland.

Dated this 15 day of September, 2000.

An officer authorised by the
Controller of Patents, Designs and Trademarks.

FORM NO. 1

Request for the Grant of a Patent

S990760

PATENTS ACT, 1992

The Applicant(s) named herein hereby request(s)

☐ the grant of a patent under Part II of the Act

☒ the grant of a short-term patent under Part III of the Act

on the basis of the information furnished hereunder

1. **Applicant(s)**

Name DAIRYGOLD TECHNOLOGIES LIMITED

Address Stapleton House
89 South Mall
Cork
Ireland

Description/Nationality an Irish company

2. **Title of Invention** PROCESS FOR THE IN-LINE PACKAGING OF FOOD PRODUCTS

3. **Declaration of Priority on basis of previously filed application(s) for same invention (Sections 25 & 26)**

Previous Filing Date	Country in or for which Filed	Filing No.
.....	.....	.....
.....	.....	.....
.....	.....	.....

4. **Identification of Inventor(s)**

Name(s) of person(s) believed by Applicant(s) to be the Inventor(s)

.....

Address .....

.....

5. **Statement of right to be granted a patent (Section 12(2)(b))**

.....

.....

6. **Items accompanying this Request - tick as appropriate**

(i) ☒ prescribed filing fee (£50.00)
(ii) ☐ specification containing a description and claims
☒ specification containing a description only
☒ drawings referred to in description or claims
(iii) ☐ an abstract
(iv) ☐ copy of previous application(s) whose priority is claimed
(v) ☐ translation of previous application whose priority is claimed
(vi) ☒ Authorisation of Agent (this may be given at 8 if this Request is signed by the Applicant(s)

7. **Divisional Application(s)**

The following information is applicable to the present application which is made under Section 24:-

Earlier Application No. ..... Filing Date .....

8. **Agent**

The following is authorised to act as agent in all proceedings connection with the obtaining of a patent to which this request relates and in relation to any patent granted:-

MACLACHLAN & DONALDSON, 47 Merrion Square, Dublin 2

9. **Address for Service (if different to that at 8)**

MACLACHLAN & DONALDSON, at their address as recorded for the time being in the Register of Patent Agents (Rule 92)

Signed Name(s) DAIRYGOLD TECHNOLOGIES LIMITED

By J. M. McBeing
.....
MACLACHLAN & DONALDSON, Applicants' Agents

Date 9th September 1999

PROCESS FOR THE IN-LINE PACKAGING OF FOOD PRODUCTS

The present invention relates to packaging for soft ice-cream, frozen yoghurt, sherbert and the like products and in particular to a system for packaging such products in a single serving dispenser.

Traditionally, soft frozen products such as soft (aerated) ice cream are prepared at the point of sale and then dispensed into a suitable receptacle for consumption. Demands for better food safety and hygiene standards have more recently led food suppliers to move away from the traditional product toward a system in which individual portions are pre-prepared and packed, ready to be dispensed at the point of sale or consumption in a hygienic fashion which allows for the avoidance of cross-contamination between the dispensing equipment and the product.

One such system disclosed in EP 0 674 482B comprises a substantially rigid cup for holding the frozen product, the cup having an aperture in its base through which the product may be dispensed. Over the mouth of the filled cup is sealed a flexible membrane which is sized to have a surface area which matches the surface area of the interior of the cup. At the point of sale, a plunger is brought to bear on the flexible membrane, forcing it into the interior of the cup and at the same time causing the product to be dispensed through the aperture. The emptied cup is then discarded. Since the plunger never contacts the product per se, the dispensing equipment remains clean irrespective of how many portions are served and cross-contamination between different flavoured servings is avoided. However, these cups may crack from time to time under the force applied during dispensing and furthermore, the cups are relatively complex and expensive to manufacture and fill.

Also known is a one-serving ice-cream dispenser comprising a rigid cylinder having an open end and a partially closed end. The partially closed end is conically shaped, with the area about the would-be tip of the cone cut away to form a star-shaped dispenser opening. Also provided is a rigid plunger head shaped to match the inner circumference of the cylinder and having a conical nose shaped to fit into the cone-shaped end of the cylinder.

Product is filled into the open end of the cylinder, the body of which is sized to hold one serving. It is prevented from escaping through the star opening by the provision of a removable tab over the outside of the opening. Once filled, the plunger head is placed into the cylinder with its nose facing inwardly. When it is desired to dispense the ice cream, the tab is removed and a plunger rod engages the plunger head, and forces it along the cylinder until all the product is extruded through the opening. Then, the cylinder and plunger head are discarded. This arrangement is hygienic and convenient for the end user, but is somewhat expensive.

The present invention seeks to overcome the disadvantages of the known prior art by providing a relatively simpler package and packaging system for edible products.

The present invention provides a process for packaging a food product comprising

a) advancing a base web of thermoformable material to a forming station and thermoforming a portion of the web at the forming station into at least one pot; and

b) transferring the web with formed pot to a filling station and filling the pot with the food product;

at the same time

c) advancing a top web to a punching station and punching at least one product dispensing aperture in the web;

and thereafter conducting the further steps of

d) bringing the base and top webs together in register so that an area of top web defining a lid and having a punched aperture therein overlies a filled mouth of a pot and sealing the lid to the pot to form a lidded pot;

e) advancing the lidded pot or pots to a cooling chamber and holding the pot suspended therein until the product in the pot has solidified; and

f) fixing a sealing member over the aperture at any point after step c.

In a preferred process according to the invention, more than one pot is formed in the web at a time and preferably, a row, column or array of pots is formed at each pass of the forming station. Simultaneously, a corresponding number of lids is formed in the top web.

In one particularly convenient arrangement, the top web is thermoformed to fabricate into it truncated dome-shaped lids and the aperture is formed in the planer surface of the dome. Conveniently, the aperture is shaped so as to impart a desired cross-sectional shape to product extruded therethrough.

The filled, lidded, sealed pots are preferably separated from the web after the sealing of the aperture by cutting the area of webs between adjacent pots or groups of pots. Alternatively, the areas between adjacent pots or groups of pots may be scored to enable individual pots or groups of pots to be snapped apart. Conveniently, the pots are separated into groups of 2, 4, 6 or 8 and score mark are made in the web between the pots in the group to facilitate separation of one pot from another.

In a further step, the pots or groups of pots are transferred from the cooling chamber to a packaging area. The process is preferably carried out as a continuous, in-line process.

The invention will now be described more particularly with reference to the accompanying drawings which show, by way of example only, an embodiment of an in-line packaging system according to the invention.

In the drawings:

Figure 1 is a schematic drawing illustrating the various steps of the in-line packaging system;

Figures 2a to 2c depict schematically the steps of dispensing product from a lidded container prepared by the scheme shown in Figure 1; and

Figure 3 is a elevation view of a package according to the invention.

Referring to Figure 1, the main steps of in-line forming of a cup-like container or pot, filling the container with product, lidding and sealing the container and finally chilling the prepared packages are shown schematically. Reel 1 carries a roll of a deformable flexible web 2 of material which ultimately becomes the cup-like container or pot for the product. Web 2 is fed via guide 7 to a forming station 8. Deformable web 2 can be comprised of any suitable plastics material which is known in the art and which is capable of retaining an allocated, thermoformed shape which has sufficient strength to withstand the normal conditions which product packages of the type discussed herein (such as ice-cream and frozen yoghurt) encounter during manufacture, transport and handling, yet is flimsy enough to collapse under dispensing pressure as will be described below in relation to Figure 2. Polyethylene or nylon poly films are suitable for such purpose. One particular material which is suitable for this purpose is film of thickness 100 micrometres, such as a laminated nylon/low density polyethylene film of 100 micrometres thickness, of which 40 micrometres is the nylon layer and 60 micrometres is the thickness of the low density polyethylene layer.

On being transported into forming station 8, web 2 is subjected to thermoforming by a die (not shown) located within the station 8 so as to form it into a series of pots 9, each of which is sufficiently flimsy so that the pot will deform and crush under pressure. By providing the web 2 in a desirable width and by providing forming station 8 with an appropriate number of shaping dies, any desired number of pots 9 can be formed simultaneously at the forming station 8, including the formation of an array of pots 9.

As web 2 with formed pots 9 continues to advance, the pots 9 pass to and through a filling station 10 at which the pots 9 are filled singly or simultaneously with product. So as to minimise any distortion of the pot during filling, the filler nozzle may be lowered near to the base 9b (Figure 3) of the pot before discharging product, and the filler nozzle is withdrawn from the pot during filling so that it remains close to but above the rising level of product in the pot. This also avoids the possibility of air pockets becoming trapped in the product.

Simultaneously with the forming and filling of the pots 9, lids for the pots 9 are formed from a web 4 carried on reel 3. Web 4 is comprised of any suitable material which has sufficient strength and rigidity to enable it to suspend from it the weight of a filled pot 9, as will be described below. One suitable material for this purpose is high density polyethylene of about 1mm thickness. Preferably, the web 4 material is thermoformable, however, this is not essential to the invention. In the case where a thermoformable web 4 is selected, it is optionally advanced to a lid forming station 11, at which it is thermoformed by a dye (or series of dyes) into a contoured shape to be described below in relation to Figure 3 to form lids 12 which remain connected together at this stage.

Irrespective of whether or not contoured lids 12 are formed in it, the web 4 is next advanced to a punching station 13 at which a dispensing aperture 14 is punched through each lid 12. At the point of sale or consumption, the product is dispensed from the pot through the aperture 14 and since products such as whipped or aerated ice-cream are habitually extruded through a star-shaped nozzle, it is preferred that aperture 14 should likewise be star shaped to apply the desired cross-sectional shape to the extruded product.

After punching, web 4 advances to a sealing station 15 at which aperture 14 is covered with a removable seal. The seal is drawn from a web 6 of sealing film which is fed from a reel 5. At sealing station 15, a seal 16 is cut from web 6 and applied to the area of the lid 12 about the aperture 14 and is fixed thereto to seal the aperture. Alternatively, web 6 may be a carrier for pre-cut, individual seals 16. The seals 16 may be of metal foil, waxed paper, flimsy polyethylene or any other material which is suitable for sealing with the material of the lid web 4. It is advantageously coated with adhesive which may be of the heat activated type or with heat sealable lacquer or with other suitable fixing means. The seals are advantageously pre-printed with product and/or proprietary information.

At assembly station 17, the filled pots 9 and sealed lids 12 are brought together and a lid 12 is sealed over the mouth of each pot 9 to form a product package as shown in Figure 3. Whilst Figure 3 shows a single product, it is to be understood that a number of individual packages may remain connected to one another in a chain or array ready to be separated from one another at any time up to the point of dispensing. The final separated package

shown in Figure 3 comprises the pot 9 having a relatively thinner wall 9a and base 9b and a relatively thicker flange 9c extending outwardly about the mouth of the pot, the flange 9c having the thickness of the web 2 from which the pots are thermoformed. Lid 12 has a contoured, truncated dome shape with an outwardly extending flange 12a. At the assembly station 17, the flanges 9c of the pot and 12a of the lid are sealed together. Seal 16 is sized to overlap beyond the aperture 14 to provide a free end which can easily be grasped to enable the seal to be removed from the lid.

Various known sealing means may be employed to seal the lid 12 to the pot 9, including but not limited to heat sealing or ultrasound welding.

Moreover at assembly station 17 or optionally at a station downstream from it (not shown), cutters are provided wholly or partially to cut through the sealed together flanges 9c, 12a to separate the individual packages from one another or to weaken the flanges between pots so that individual packages can be broken or snapped apart. Conveniently, the cutters partially cut through or score the webs by cutting in a direction which cuts wholly through the relatively thinner flange 9a of the pot and partially through the relatively thicker flange 12a of the lid. The latter enables the pots to be separated from one another by being snapped apart.

The sealed flanges 9c, 12a provide a means by which the filled pot or pots may be suspended from a frame, grid or rack and this feature is particularly advantageous where the product is a frozen product. In order to enable it to be pumped for filling at the filling station 10, such a product must at that stage be at a temperature at which it is sufficiently soft to be pumpable. For a product such as whipped ice cream, the temperature for filling will be typically between –1°C and –10°C. After the packages are sealed, they are transferred to a cooling chamber, which may be a continuous chamber, and the product is cooled in the cooling chamber down to a temperature of between –15°C and –30°C to freeze it solid. Whilst the pots 9 are crushable, they have sufficient intrinsic strength to enable them substantially to retain their thermoformed shape during the steps from filling to freezing. Since they can be moved to and through the cooling chamber suspended from the lids rather than resting on their bases, a superior circulation of cooling air about the pot

can be achieved, enabling optimal conditions for product quality assurance to be maintained during freezing. Thus, the time that the packages spend in the cooling chamber can be controlled more easily to ensure that freezing occurs at a rate sufficient to avoid the growth of ice crystals to a size which would adversely affect the organoleptic qualities of the ice cream. Once the product is frozen solid, the packages will retain their shape so long as the temperature of the product is maintained below the point at which the product is solid and accordingly, further steps of packing, palletising and transporting can be undertaken without risk to the product shape, despite the relatively flimsy nature of the pot.

Seal 16 need not be applied to the lid 12 directly after punching station 13, and in fact, this step can be carried out at any point in the process after the punching of aperture 14 in the lid 12 and prior to boxing of the packages.

When it is desired to dispense the product, an individual package is moved to a tempering cooler held at a suitable tempering temperature and held there until the product has warmed throughout to that temperature to resume a soft, flowable state.

When it is desired to dispense the product, the package is removed from the tempering cooler and placed, lid 12 facing down, in a retaining aperture 0 formed in a holding plate P as shown in Figure 2a. The package is retained in place with the lid 12 extending through the aperture 0 by means of the engagement of the flanges 9c, 12a with the plate P. The collar C of dispenser D is placed over the inverted pot 9 (see Figure 2b). The seal 16 is peeled away to expose the aperture 14 of the lid either at this stage or on removal of the package from the cooler. Next, and as shown in Figure 2c, the product is dispensed from the package by pressing downward on plunger A causing the plunger head H to press against the base 9b of pot 9. As pressure develops and continues to be exerted, head H travels down inside collar C, causing pot 9 to crush toward lid 12 and causing its contents to be expelled through aperture 14 into a waiting receptacle (not shown). During the crushing, collar C guides pot 9 to crush straight toward the lid and this ensures that practically all the product is dispensed, rather than allowing a portion of it to become trapped in a pocket of the pot which could form were the pot to be allowed to move sideways as it is crushed.

Head H is contoured to match the shape of the lid 12 to ensure that all the contents of the pot are dispensed. Thereafter, the crushed, empty package is discarded to waste and the dispenser is ready for reuse. No cleaning is required, even when changing between product flavours, since the product never comes into direct contact with the dispenser. Furthermore, since the aperture 14 stands clear of the plate P, this plate does not come into contact with product and accordingly, no cross-contamination can occur. Thus, the product presented to the consumer is as safe and as hygienic as it was when it was first packaged.

The material of the lid 12 will be chosen to be sufficiently strong so that it can (1) support the weight of a filled pot suspended from it, (2) support the inverted pot during dispensing against the pressure exerted by the plunger tending to deform it (possibly causing the package to slip through aperture 0) and (3) retain the allocated shape, star – or otherwise, of the aperture 14 so that the material about this aperture does not deform or bend unduly during dispensing causing the product to be extruded not in accordance with the desired shape.

In an alternative embodiment (not shown), the lid may be fabricated from a material which is as flimsy as the thermoformed walls and base of the pot. In this case, the lid would be provided with a hardened portion or button in which a dispensing aperture is formed. The button would provide a seating for bearing against the plate in the dispenser to enable the product to be extruded through the aperture.

Once the product is frozen solid, it can be stored in a freezer resting on its base 9b with the lid facing uppermost. Either the lid or the seal, or indeed both, can carry information such as an identification of the product and of the particular flavour of product within a particular package and this information can easily be seen to help a person in selecting the desired product flavour from amongst a selection of differently flavoured products.

Whilst the invention has been described particularly with reference to a single-serving package, it will be appreciated that the invention is equally suitable for the production of a

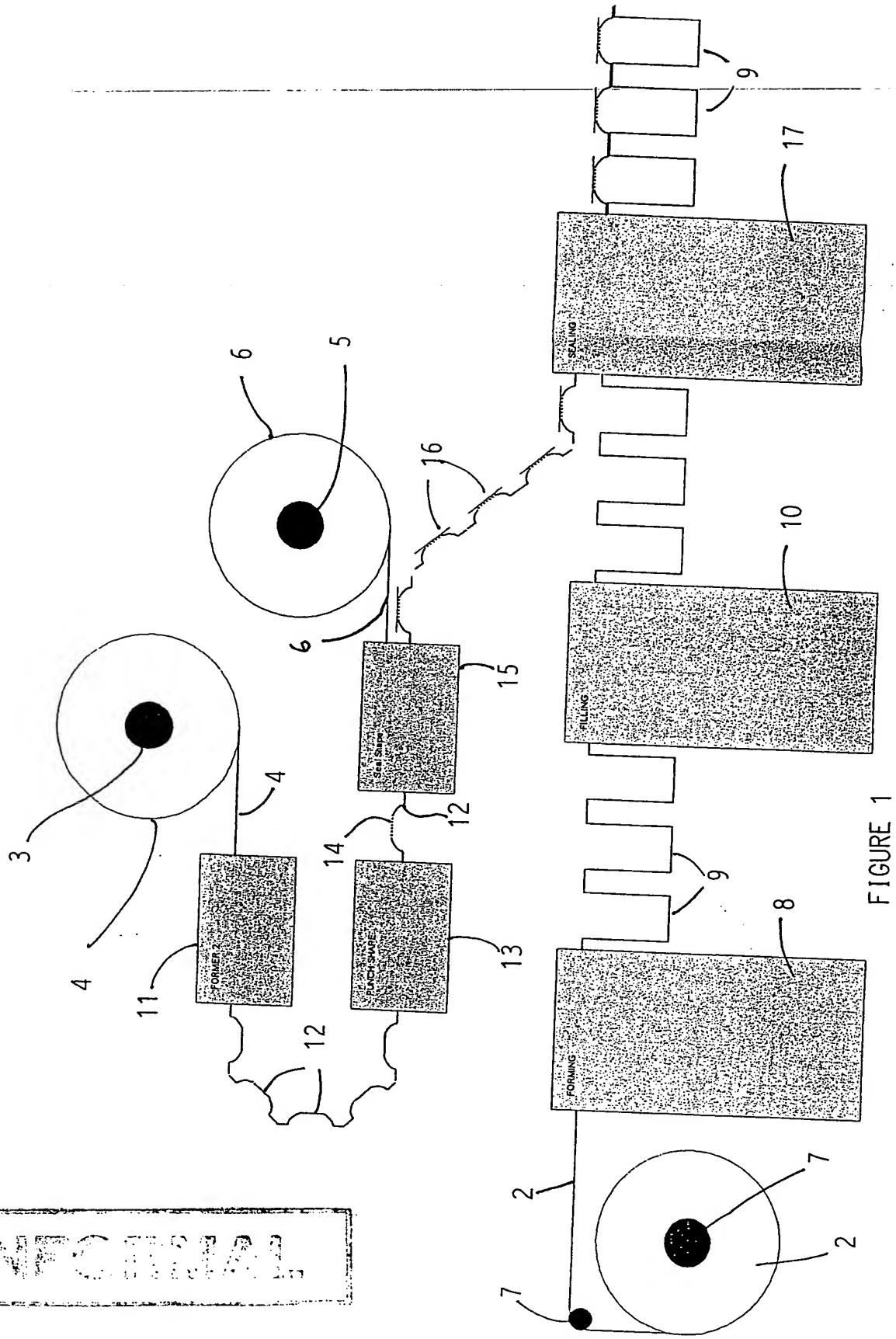

FIGURE 1

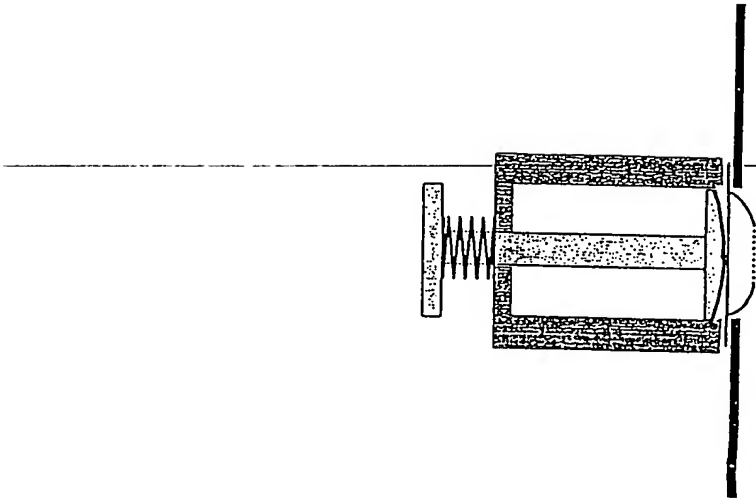

FIGURE 2c

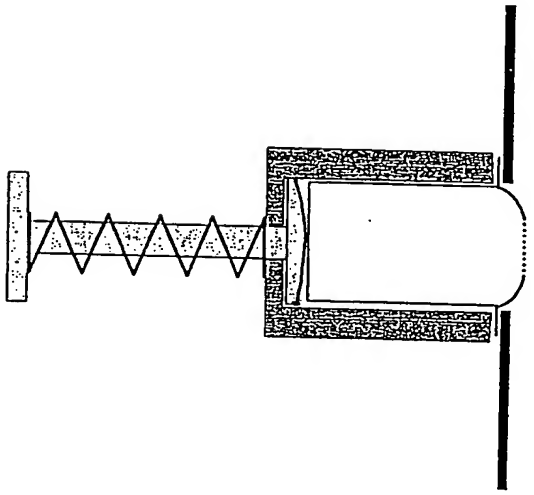

FIGURE 2b

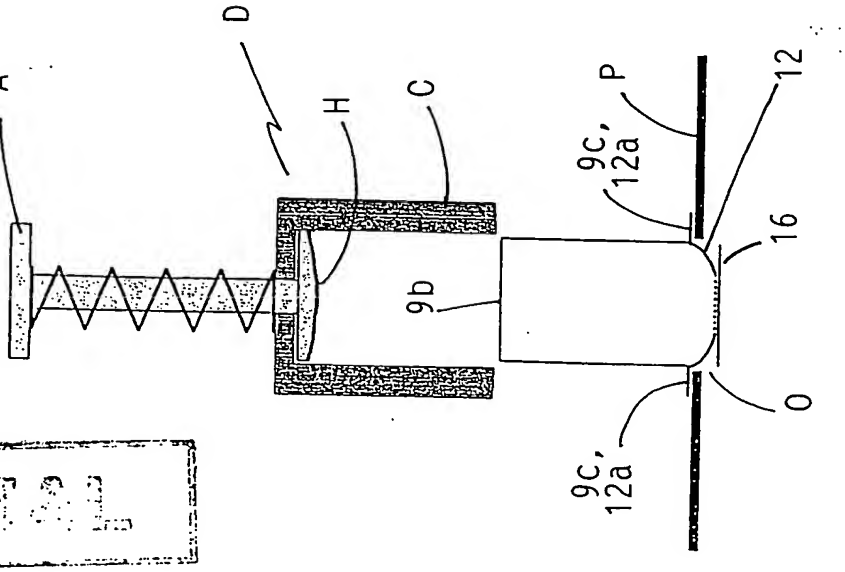

FIGURE 2a

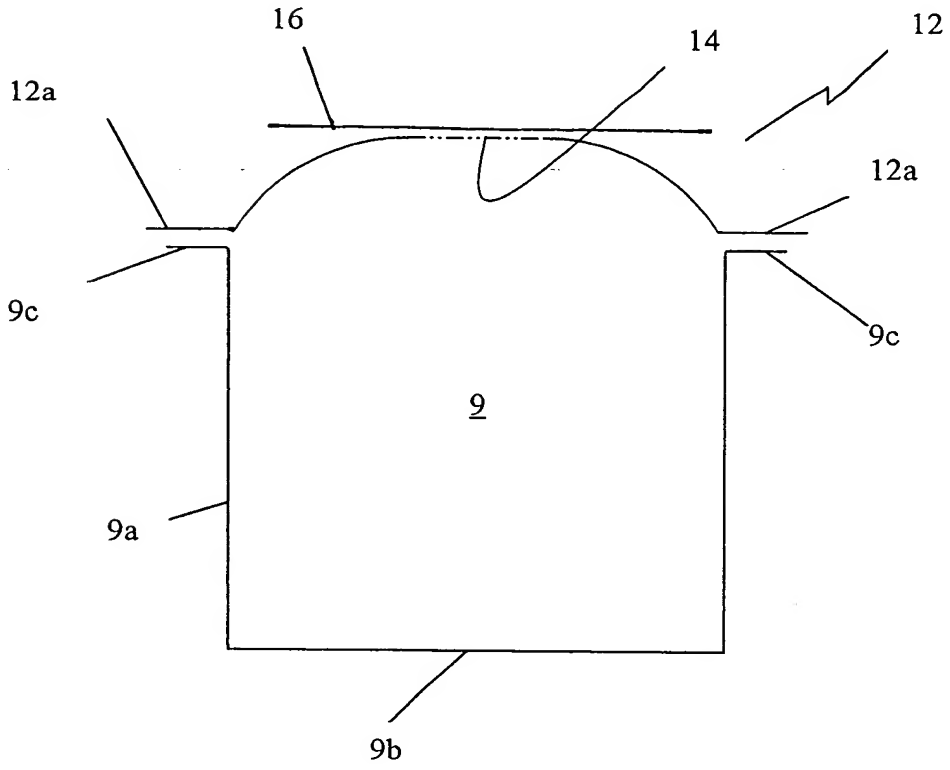

Figure 3